

AUTOMOBILE NEWS FOR THE DEALER AND THE CAR OWNER

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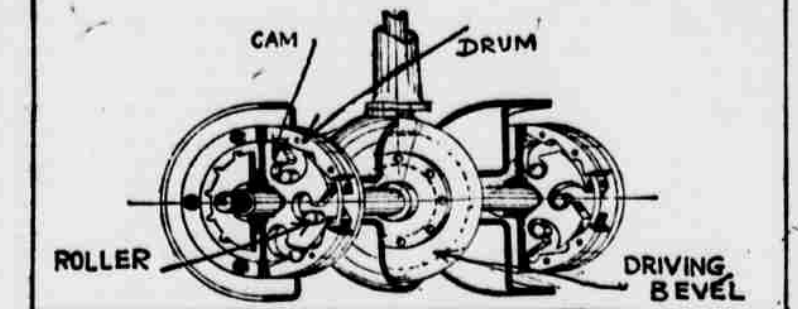
INTERESTING EXPLANATION OF DIFFERENTIAL ACTION

The Seventieth of a Series of Articles Written by an Expert for the Automobile Owner.

By WALTER SHIELDS.

One of the hardest things a new automobile owner has to do is to understand the operation of a differential, the set of gears mounted in the center of the rear axle. It is generally known by new owners that a differential, or compensating gear, is needed to enable one rear wheel to turn faster than another when the car is turning around a corner, so there will be no sliding around due to the fact that one wheel must travel further than the other. The true understanding of the operation of a differential never becomes quite clear to

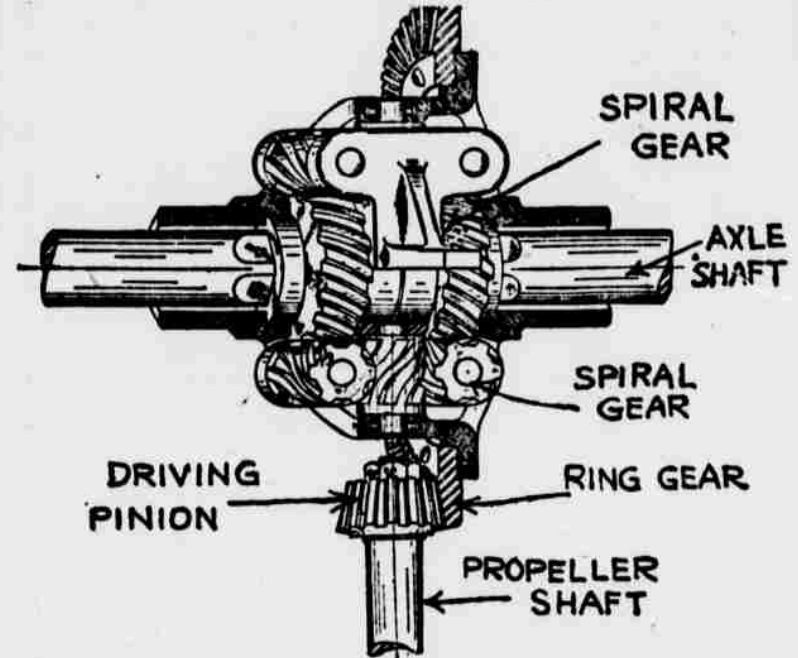
and many of the other difficulties mentioned were overcome. There are many trucks and buses in this country running without differentials and give good results because the speed of travel is low. At first it might appear as though the differential car in taking a turn will have to slide part way around, and this will increase tire wear. But when the turn is taken slowly the tire wear, as determined in numerous tests, has been found to be practically the same as that in the differential equipped car and in some cases even less. However, for ordinary touring



A type of rear axle using a solid shaft and having a free wheel feature allowing the outer wheel to turn freely when a corner is turned yet giving equal traction to both wheels when driving straight.

the owner, even after he has driven thousands of miles, unless he has actually seen the unit isolated. Then by playing around with it the operation becomes clear. Just to illustrate the way in which a differential permits one wheel to go faster than another or one to move backward while the other revolves in the opposite direction, take two pencils. Stick the ends through two circular pieces of cardboard. Holding these horizontally so that the cardboard faces place two small pieces of a pencil between the cardboard. Place the pencils in line. Now holding the full size pencils horizontally between the fingers of either hand they may be turned in opposite directions and in doing so the discs roll around on the small pieces of pencil. The action may be reversed or if the effort on each pencil is the same the

cars driven by our American drivers, it is quite out of the question to use a differential axle, because the driver will not be satisfied. His utter disgust will come when he has to push his car around a turn by hand, the garagemen's usual performance. Many racing cars operating on banked speedways have been driven without differentials, and though it was noticeable to the driver, the results were good. De Palma and Rickenbacker both drove cars without differentials, the former finding little fault, while the latter gave it up after one race. Another disadvantage of the car without differential is that both rear wheels always will have to be of the same size, otherwise one tire will be ground down, the small wheel sliding.



Spiral gear differential in which the friction between the gears causes the unit to give equal traction to both wheels all the time.

whole assembly may be revolved in one direction, and in this case the pieces of pencils between the cardboard will not move at all with relation to the rest of the parts. Also one pencil and its disc may be held still while the other may be revolved. Now instead of pencils there are axle shafts and instead of cardboard discs there are bevel gears. These bevel gears mesh with two or four others corresponding to the pieces of pencil. These latter bevels are mounted on what is called a spider and the latter fits into suitable holders in the driving bevel, or so-called ring gear.

That described is the conventional differential and is used to-day on all passenger cars and practically all commercial cars. However, it has inherent faults, and because of these faults differentials of different design have been constructed. The most unwelcome characteristic of the ordinary differential is that it allows the wheel with the least traction to get the greatest amount of power.

Motorists who have been stuck in the mud know that this is quite a serious fault, and even is evident when one wheel only is in mud or on a slippery spot. In such a case the wheel on the slippery spot gets the greater power, hence that wheel spins around without helping to move the car, while the other wheel remains still. You often have seen a motor truck or passenger car with one wheel spinning around at a great rate, while the other wheel does not move at all, nor does the car move an inch. This is because the wheels have unequal traction, and the ordinary differential in this case causes the power to be used up turning the wheel with the least traction instead of giving both wheels equal traction.

Every time one rear wheel leaves the ground it spins around very fast, due to differential action allowing the wheel with the lesser traction to get the power. Now to the owner this means increased tire wear, because each time that rapidly spinning wheel again strikes the ground some of the tire tread is ground off. There also is another point to be considered, and that is with reference to skidding when the brakes are applied. Once a wheel begins to slide it is useless, and with an ordinary differential it is a general thing for one wheel on a slippery pavement to hold back or lock when the brakes are applied, while the other wheel revolves. This starts a skid, and so long as that one wheel is locked, or both if you wish, the direction the vehicle takes is a matter of speculation.

To overcome these inherent faults other differentials have been designed, and the use of no differential at all has been tried and quite successfully. Vehicles that run on tracks, such as trains, street cars and the like, use no differentials, so, it is argued, why cannot an automobile? It can, but not with quite the same results in turning, especially when a fast turn is made, that is had with the differential. Those who remember the cycle cars of a few years ago, recall that most of them had no differentials. Cars without this unit were built in France and England, and it was found that skidding tendency was reduced, a higher speed could be had

left or right by the threads on the shaft and gripped a cup on the wheel in order to get the power to the wheel. On taking a turn the outer wheel was automatically disconnected and ran free. Numerous "free wheel" types were introduced later, one of them having clutches consisting of two cams, one on each end, fastened to the solid axle. When driving straight ahead these cams forced rollers against a drum, which was attached to the driving wheel, giving equal pull on both wheels. In taking a corner the rollers in the outer wheel were forced back, releasing the connection between cam and drum and the outer wheel ran free. When the straight course was again reached the rollers locked the cams to the drums and the pull was even.

SPLENDID SERVICE TO THE GOVERNMENT

John N. Willys Tells Stockholders of War Work Under Way.

In his address to stockholders at the annual meeting of the Willys-Overland Company President John N. Willys said:

"Since our last annual meeting the United States has had to adjust itself from peace to war conditions. You will remember, at that meeting we had been in the war a little over one month. The automobile industry was considerably slowed down by these changed conditions, but recovered rapidly and we had a satisfactory business all through the summer. The officers of your company immediately offered the entire facilities of our organization and its plants to the Government. We believed it was vital and necessary that the Government should have such of these facilities as they required, and to that end we have cooperated in every way possible with its officials and have accepted four large contracts and a number of smaller ones for Government work."

"The first large contract was through our Toronto plant with the British Government for 1,000 Sunbeam aeroplane motors. There have been many engineering changes, so that production is just now starting on this motor. A small quantity of these motors have been manufactured and accepted and actual deliveries should now come along rapidly."

"The second large contract was for 1,000 Curtiss eight cylinder training motors, for use in training planes at the several cantonments already established in this country. To take care of this contract three buildings were constructed at Elmira—an assembling plant, testing plant and a take down and reassembling plant—so that with these buildings, together with the buildings and equipment already at Elmira when the war began, we believe we have there to-day the finest airplane motor manufacturing and testing plant in the world. We had promised a small number of these motors in November and December, but on account of the unusually severe weather and delays in constructing the new buildings we did

Peerless Trucks in Anti-aircraft Service.



Herewith are shown two Peerless motor trucks carrying anti-aircraft guns at the battle front. At the moment the photograph was taken there was a hurry up call for action and the crews are shown rushing to their positions. Walter Woods

not commence deliveries until January. In March the original schedule in the contract called for delivery of 700 motors—we delivered that month 835 motors. In April, the original schedule called for delivery of 800 motors—we delivered in that month 1,003 motors. On April 30 we were only two weeks behind our contract schedule. May 15 we could have exceeded contract schedule had the Government needed these training motors. As they did not require them we have not speeded up our production, but will deliver in June, according to contract, 1,000 motors. We have now delivered over 2,500 of these 8000 motors, and to my knowledge we have not yet had a single complaint regarding them. We have received large orders for parts for these training motors, on which we are now beginning deliveries from our Elmira plant, and as we now have the equipment and tools complete we will be able to furnish the Government, without delay, all they require in the way of parts for training motors."

"While there has been a great deal of criticism about the delay in the Government's aero programme, we feel that our stockholders should know that, so far as your company is concerned, there has been practically no delay, and as stated before we could today, if the Government wished, be ahead of our original schedule."

"You will also be interested in learning that when the meeting a year ago your company had purchased a large interest in the Curtiss Aeroplane and Motor Corporation, which with the help given by your company we feel sure we have seen of great assistance to the Government. The Curtiss company has grown very rapidly. Naturally in a new indus-

try which has shown such great development as has the manufacture of airplanes there have been a great many problems to overcome. These have been surmounted and the development of the manufacturing organization of the Curtiss Company is being taken care of. Our vice-president, J. E. Keppeler, is in charge of the Curtiss plant, and the result of his management, I am sure, will show very satisfactorily in the next few months."

"The Curtiss company a year ago was producing at the rate of about \$100,000 a month—today they are running very nearly \$500,000 a month. They have buildings and equipment which with increased efficiency in their organization I believe will be able to produce aircraft approximating something over \$1,000,000 a month before the year is out."

"The third large order was taken by the Toledo plant for approximately 3,000 gun carriages. We have been busy for several months making tools and preparing for delivery of these gun carriages, which will begin with a small number in June and increasingly larger quantities thereafter monthly. Our equipment is particularly adapted to the building of these gun carriages and we look forward to satisfying the Government's order on this order and feel quite certain that our deliveries will be so satisfactory that we will be given additional orders."

"The fourth large contract was for machining large size shells. This contract will amount to about \$1,000,000. We have created a special department for this shell business the same as we have done for the gun carriages and have so placed it in our plant that we will still be able to continue the manufacture of automobiles in reasonable quantities."

NEW MOTOMETER MODEL.

A new model for Ford cars has been announced by the makers of the motometer. It is fashioned especially to fit the needs of the Ford cars and is to be placed on the market at \$2.75 complete with a handsome nickel-plated radiator cap. The motometer has come to be considered a necessity by every class of motorists, and for this reason the Motometer Company of Long Island City, N. Y., has a model to fit every car and purse. The four models previously announced are the Standard at \$10, the Overland at \$10, the Junior at \$5 and the Midway at \$2.50. All models are sold with a full guarantee.

The motometer is the danger signal of motor trouble. It is attached to the radiator cap and registers the temperature of the air and steam above the level of the water in the radiator. As almost every defect in a motor, such as a leaky piston ring, warped valves or faulty oil, will be immediately reflected in the temperature of the water, the motometer instantly registers "danger."

The driver cannot fail to see the signal, as it is directly in his line of vision, and no driver will willfully disregard signs of a defective motor.

The new model, designed especially to guard Ford cars against sudden changes of temperature, not only saves wear and tear on the engine and prolongs the life of the car, but it adds materially to the attractiveness of the car.

KEEP UP PRODUCTION!

Italy Shows Us a Wise Automobile Policy.

"The importance of keeping the automobile industry productive cannot be overemphasized," says J. B. Hallett of the Brady-Murray Motors Corporation. "It is not alone a matter of meeting the needs of our own country but of taking care of exports. Many countries, especially in South America, on whom we depend for raw materials want our automobiles. They give us what we want for what they want. And as they want automobiles we must keep them supplied if we are to hold a commanding position in foreign trade after the war. The war necessities of the hour are great, but they are not so great that we cannot with perfect safety and profit look ahead to our market needs after the war."

"The situation in Italy is an interesting one, and surely our resources are greater than Italy's. The motor industry of Italy now stands third in the importance of its exports compared with other manufactured goods. First place is held by cotton goods, either completely or partially manufactured, the value of which is 254,897,940 lire for the year 1917. Silk goods occupy second place, with a value of 179,637,882 lire. Then come automobiles, with a value of 114,978,805 lire."

"Unfortunately trade statistics deal only with exports and do not show the total output of the various motor factories at Turin and Milan. It can be gathered, however, that the development of these factories has been on an unprecedented scale, the Fiat company alone having in its employ 30,000 workmen."

"There is no curtailment in the output of Italy's factories but instead an amazing increase in productivity. Italy not only is taking care of present needs but preparing for business after the war. Why shouldn't America with its splendid lead on the world in motor car manufacturing also look ahead and be prepared?"

GEAR RATIO IMPORTANT.

Interesting Explanation of a Technical Construction Point.

Among more or less technical motor car terms, the rear axle gear ratio is probably as puzzling and meaningless to any other than the average car owner or mechanic. It applies to the number of teeth in the rear axle gear which transmit the engine's power to the driving wheels. In other words, it governs the relative speed of the engine and the rear wheels, as that relation, acting in conjunction with maximum and minimum car speed, gear-up and pulling ability.

The Cadillac Motor Car Company recently advised its dealers that one of the specifications which should receive special attention in car orders is the gear ratio, pointing out that the character of the country in which the car will be driven, or the work to be done, should guide the selection of the gear ratio.

A gear ratio of four and a half to one, for example, means that the engine crankshaft makes four and a half revolutions while the rear wheels make one revolution. It is not difficult to understand that a car so equipped will have a faster getaway and be more powerful in sand and on hills, in high gear, than a car with a three and a half to one ratio.

A Rapid Rise.



R. B. Cole has been appointed president in charge of sales of the Hudson Motor Car Company of New York, Inc. Announcement to this effect, which took place on June 1, is made by Harry S. Hout, president of the company.

Mr. Cole was branch manager in Brooklyn with Harry S. Hout, Inc., at the time the Hudson Motor Car Company of New York took over a Hudson Motor Car Company branch in Brooklyn. Mr. Cole continued as manager of the Brooklyn branch until October 22, 1917, when in recognition of his ability he was promoted to the general sales management of the Hudson Motor Car Company of New York, Inc. His appointment to the vice-presidency marks one of the most rapid advancements in the local automobile field.

WOMAN DRIVES CAMP JITNEY.

Doing Well Between Hempstead and Camp Mills.

Although more than 700 licenses have been issued to the Jitney operating between Hempstead and Camp Mills, Long Island, the first woman driver took a license last week. She is Miss Anna Reed of this city. She has a chauffeur's license and since receiving the Jitney license has been doing excellently well with her Maxwell touring car by carrying passengers to the camp. "This," says Harry De Boer, manager of the Maxwell Sales Corporation, "is only one of a great many cases that have been brought to our attention where women are entering every branch of the motor car industry."

CHANDLER SIX
Famous For Its Marvelous Motor

Now Is the Best Time to Get Your Sedan

THOSE who bought Chandler sedans last Fall, with the Winter in mind, find now that they have a most delightful Summer car. And those who buy now, with the Summer in mind, will find in a few months that they have a most comfortable Winter car.

For the handsome Fisher-built convertible sedan body which is mounted on the Chandler chassis is quite as much a Summer car as it is a Winter car. It is an open car when you want it open, and a closed car when you want it closed. All the windows are instantly adjustable and may be either entirely lowered away into the body panels or removed. The car is roomy, splendidly upholstered and seats seven in perfect comfort. The auxiliary seats face forward.

There can never be a better time of year than right now to get your sedan.

SIX ATTRACTIVE CHANDLER MODELS

Seven-Passenger Touring Car, \$1798	Four-Passenger Roadster, \$1798
Four-Passenger Dispatch Car, \$1675	
Convertible Sedan, \$2498	Convertible Coupe, \$2398
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It looks well, it rides easily, it is simple to handle, it is powerful and it is efficient.

To all these virtues add its advantage of economy and you understand why more than 100,000 Model 90 cars have already been sold.

It has electric Auto-Lite starting and lighting, vacuum gasoline system, large tires, non-skid rear, 106-inch wheelbase and cantilever springs.

Five points of Overland superiority:
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